

**Sem 2 Midterm Review**

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Date\_\_\_\_\_ Period\_\_\_\_

**Simplify each expression.**

1)  $(3a^3 + 2a^4 - 5a^2) + (2a + 3a^3 - a^4)$

2)  $(4 + 7x^3 + 5x^2) + (7x^2 - 2 + 3x^3)$

3)  $(n^4 - 5n^2 - 2) + (2n^2 + 3n^4 - 7)$

**State the degree and leading coefficient.**

4)  $6m^2$

5)  $-8x^5$

**Find each product.**

6)  $(-2b + 1)(7b - 7)$

7)  $(3v - 2)(6v - 4)$

8)  $(-2x + 4)(6x^2 - 8x + 2)$

9)  $(3n - 8)(5n^2 + 4n + 1)$

**Evaluate each function.**

10)  $f(x) = x^2 + 5$ ; Find  $f(-7)$

11)  $g(n) = n^3 - 2n$ ; Find  $g(2)$

12)  $k(a) = a^2 + 2a$ ; Find  $k(9)$

**Factor each completely.**

13)  $27x^3 - 1$

14)  $2 - 16u^3$

15)  $3x^3 - 24$

16)  $p^2 - 4$

17)  $9x^2 + 30x + 25$

18)  $25n^2 - 4$

**Find all roots.**

19)  $x^4 + 8x^3 + 15x^2 = 0$

20)  $x^6 - 4x^4 - 9x^2 + 36 = 0$

21)  $x^4 - 8x^2 - 9 = 0$

22)  $x^6 - 63x^3 - 64 = 0$

23)  $x^4 - 6x^2 + 8 = 0$

24)  $x^4 - 11x^2 + 28 = 0$

25)  $x^3 - 125 = 0$

26)  $x^4 - 3x^2 - 10 = 0$

**Factor each completely.**

27)  $96k^3 + 36k^2 + 144k + 54$

28)  $24a^3 + 28a^2 + 42a + 49$

29)  $224p^3 + 56p^2 - 256p - 64$

**Divide.**

30)  $(n^3 - 12n^2 + 14n + 5) \div (n - 2)$

31)  $(6x^3 + 38x^2 - 83x - 15) \div (x + 8)$

32)  $(m^3 - 4m^2 - 3m + 19) \div (m + 2)$

**Write a polynomial function of least degree with integral coefficients that has the given zeros.**

33) 1, 2,  $\frac{3}{2}$

34) 4, 2,  $-\frac{3}{5}$

35)  $-3, -\frac{2}{5}, -1$

**Approximate the relative minima and relative maxima of each function to the nearest tenth.**

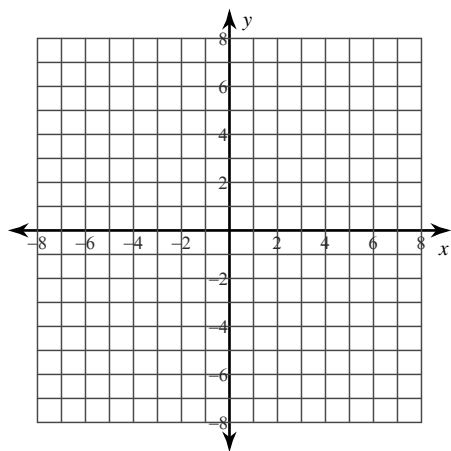
36)  $f(x) = x^3 - 4x^2 + 5$

37)  $f(x) = x^3 + 8x^2 + 16x + 4$

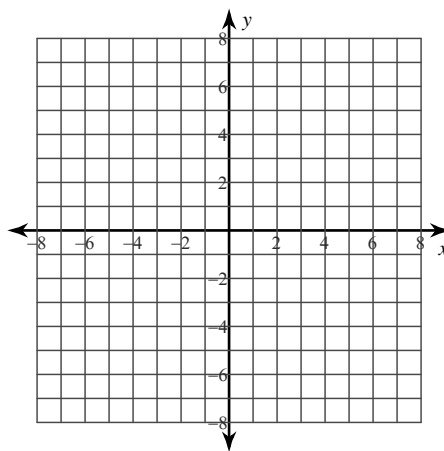
38)  $f(x) = -x^3 + 3x^2$

**Sketch the graph of each function.**

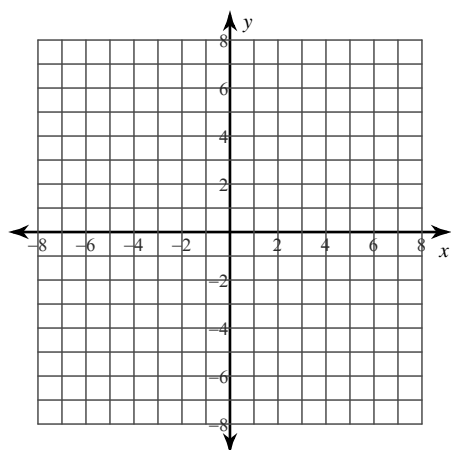
39)  $f(x) = -x^3 + 4x^2 - 7$



40)  $f(x) = x^4 - 2x^2 + x - 3$



41)  $f(x) = x^3 - 2x^2 - 2$



**Describe the end behavior of each function.**

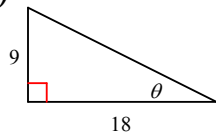
42)  $f(x) = 2x^2 + 12x + 13$

43)  $f(x) = -x^5 + 2x^3$

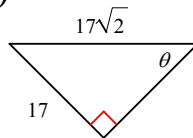
44)  $f(x) = x^4 - 3x^2 - 3x - 2$

**Find the value of the trig function indicated.**

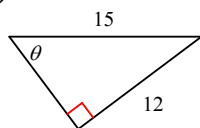
45)  $\sin \theta$



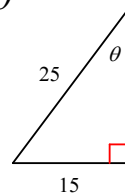
46)  $\sin \theta$



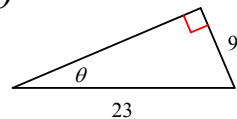
47)  $\sin \theta$



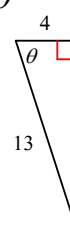
48)  $\csc \theta$



49)  $\sec \theta$

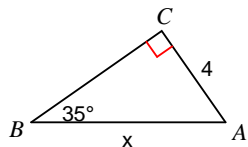


50)  $\sec \theta$

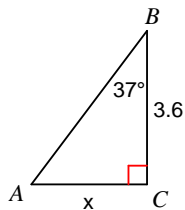


**Find the measure of each side indicated. Round to the nearest tenth.**

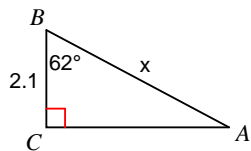
51)



52)

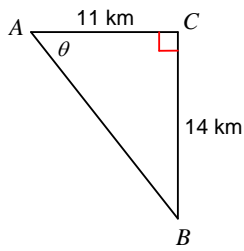


53)

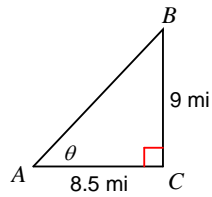


Find the measure of each angle indicated. Round to the nearest tenth.

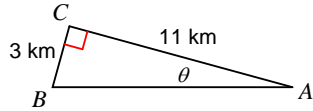
54)



55)

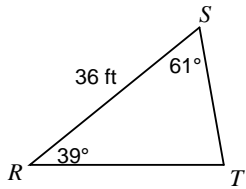


56)

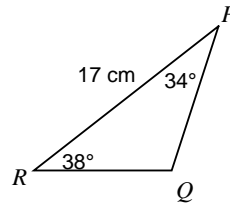


Solve each triangle. Round your answers to the nearest tenth.

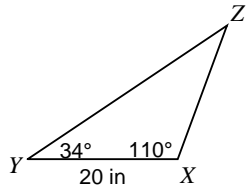
57)



58)



59)



Simplify. Your answer should contain only positive exponents.

60)  $\frac{(2 \cdot 2^{-2})^{-1}}{2}$

61)  $\frac{2^4}{2 \cdot (2^{-3})^2}$

62)  $\left(\frac{2^{-4} \cdot 2^{-3}}{2}\right)^4$

63)  $\left(\frac{2x^4y^4 \cdot 2x^3}{(x^{-2}y^2)^{-2}}\right)^3$

64)  $\frac{2y^{-1} \cdot (2yx^4)^{-2}}{2x^4}$

65)  $\left(\frac{vu^2}{u^2v^4 \cdot vu^2}\right)^{-2}$

## Sem 2 Midterm Review

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Date \_\_\_\_\_ Period \_\_\_\_\_

**Simplify each expression.**

$$1) (3a^3 + 2a^4 - 5a^2) + (2a + 3a^3 - a^4)$$

$$a^4 + 6a^3 - 5a^2 + 2a$$

$$3) (n^4 - 5n^2 - 2) + (2n^2 + 3n^4 - 7)$$

$$4n^4 - 3n^2 - 9$$

$$2) (4 + 7x^3 + 5x^2) + (7x^2 - 2 + 3x^3)$$

$$10x^3 + 12x^2 + 2$$

**State the degree and leading coefficient.**

$$4) 6m^2$$

quadratic monomial

$$5) -8x^5$$

quintic monomial

**Find each product.**

$$6) (-2b + 1)(7b - 7)$$

$$-14b^2 + 21b - 7$$

$$7) (3v - 2)(6v - 4)$$

$$18v^2 - 24v + 8$$

$$8) (-2x + 4)(6x^2 - 8x + 2)$$

$$-12x^3 + 40x^2 - 36x + 8$$

$$9) (3n - 8)(5n^2 + 4n + 1)$$

$$15n^3 - 28n^2 - 29n - 8$$

**Evaluate each function.**

$$10) f(x) = x^2 + 5; \text{ Find } f(-7)$$

$$54$$

$$11) g(n) = n^3 - 2n; \text{ Find } g(2)$$

$$4$$

$$12) k(a) = a^2 + 2a; \text{ Find } k(9)$$

$$99$$

**Factor each completely.**

$$13) 27x^3 - 1$$

$$(3x - 1)(9x^2 + 3x + 1)$$

$$14) 2 - 16u^3$$

$$2(1 - 2u)(1 + 2u + 4u^2)$$

$$15) 3x^3 - 24$$

$$3(x - 2)(x^2 + 2x + 4)$$

$$16) p^2 - 4$$

$$(p + 2)(p - 2)$$

$$17) 9x^2 + 30x + 25$$

$$(3x + 5)^2$$

$$18) 25n^2 - 4$$

$$(5n + 2)(5n - 2)$$

**Find all roots.**

19)  $x^4 + 8x^3 + 15x^2 = 0$

$\{0 \text{ mult. } 2, -5, -3\}$

20)  $x^6 - 4x^4 - 9x^2 + 36 = 0$

$\{-2, 2, i\sqrt{3}, -i\sqrt{3}, \sqrt{3}, -\sqrt{3}\}$

21)  $x^4 - 8x^2 - 9 = 0$

$\{i, -i, -3, 3\}$

22)  $x^6 - 63x^3 - 64 = 0$

$\left\{4, -2 + 2i\sqrt{3}, -2 - 2i\sqrt{3}, -1, \frac{1 + i\sqrt{3}}{2}, \frac{1 - i\sqrt{3}}{2}\right\}$

23)  $x^4 - 6x^2 + 8 = 0$

$\{\sqrt{2}, -\sqrt{2}, -2, 2\}$

24)  $x^4 - 11x^2 + 28 = 0$

$\{-2, 2, \sqrt{7}, -\sqrt{7}\}$

25)  $x^3 - 125 = 0$

$\left\{5, \frac{-5 + 5i\sqrt{3}}{2}, \frac{-5 - 5i\sqrt{3}}{2}\right\}$

26)  $x^4 - 3x^2 - 10 = 0$

$\{i\sqrt{2}, -i\sqrt{2}, \sqrt{5}, -\sqrt{5}\}$

**Factor each completely.**

27)  $96k^3 + 36k^2 + 144k + 54$

$6(2k^2 + 3)(8k + 3)$

28)  $24a^3 + 28a^2 + 42a + 49$

$(4a^2 + 7)(6a + 7)$

29)  $224p^3 + 56p^2 - 256p - 64$

$8(7p^2 - 8)(4p + 1)$

**Divide.**

30)  $(n^3 - 12n^2 + 14n + 5) \div (n - 2)$

$n^2 - 10n - 6 - \frac{7}{n - 2}$

31)  $(6x^3 + 38x^2 - 83x - 15) \div (x + 8)$

$6x^2 - 10x - 3 + \frac{9}{x + 8}$

32)  $(m^3 - 4m^2 - 3m + 19) \div (m + 2)$

$m^2 - 6m + 9 + \frac{1}{m + 2}$

**Write a polynomial function of least degree with integral coefficients that has the given zeros.**

33) 1, 2,  $\frac{3}{2}$

$f(x) = 2x^3 - 9x^2 + 13x - 6$

34) 4, 2,  $-\frac{3}{5}$

$f(x) = 5x^3 - 27x^2 + 22x + 24$

35)  $-3, -\frac{2}{5}, -1$

$$f(x) = 5x^3 + 22x^2 + 23x + 6$$

**Approximate the relative minima and relative maxima of each function to the nearest tenth.**

36)  $f(x) = x^3 - 4x^2 + 5$

Minima:  $(2.7, -4.5)$

Maxima:  $(0, 5)$

37)  $f(x) = x^3 + 8x^2 + 16x + 4$

Minima:  $(-1.3, -5.5)$

Maxima:  $(-4, 4)$

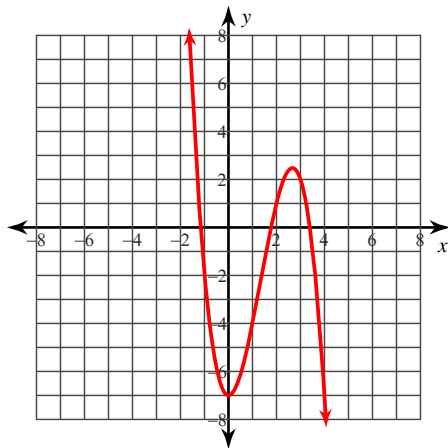
38)  $f(x) = -x^3 + 3x^2$

Minima:  $(0, 0)$

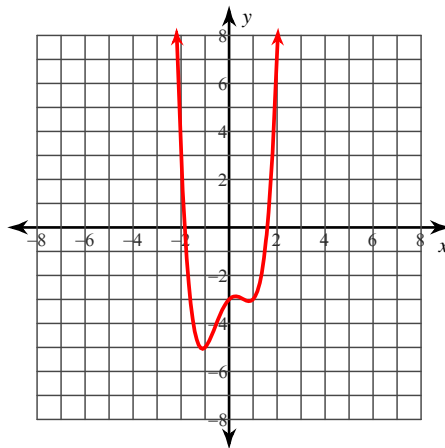
Maxima:  $(2, 4)$

**Sketch the graph of each function.**

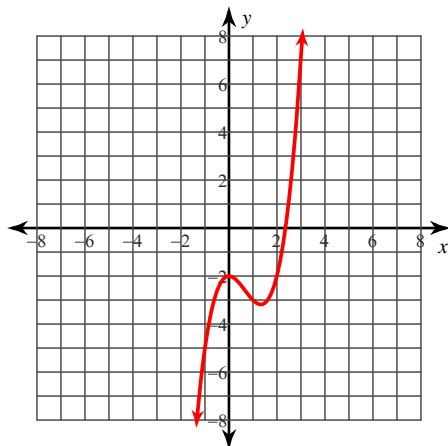
39)  $f(x) = -x^3 + 4x^2 - 7$



40)  $f(x) = x^4 - 2x^2 + x - 3$



41)  $f(x) = x^3 - 2x^2 - 2$



**Describe the end behavior of each function.**

42)  $f(x) = 2x^2 + 12x + 13$   $f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$

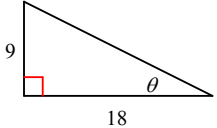
43)  $f(x) = -x^5 + 2x^3$   $f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow -\infty$  as  $x \rightarrow +\infty$



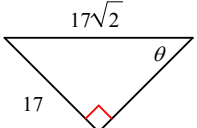
44)  $f(x) = x^4 - 3x^2 - 3x - 2$   $f(x) \rightarrow +\infty$  as  $x \rightarrow -\infty$   
 $f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$

Find the value of the trig function indicated.

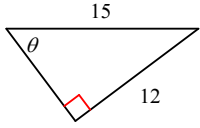
45)  $\sin \theta$   $\frac{\sqrt{5}}{5}$



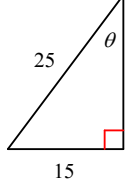
46)  $\sin \theta$   $\frac{\sqrt{2}}{2}$



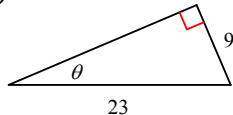
47)  $\sin \theta$   $\frac{4}{5}$



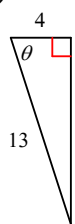
48)  $\csc \theta$   $\frac{5}{3}$



49)  $\sec \theta$   $\frac{23\sqrt{7}}{56}$

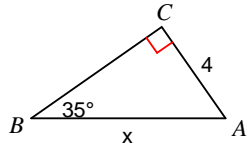


50)  $\sec \theta$   $\frac{13}{4}$

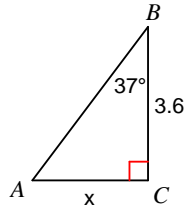


Find the measure of each side indicated. Round to the nearest tenth.

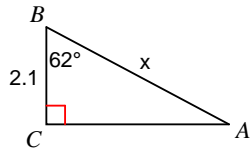
51)  $7$



52)  $2.7$

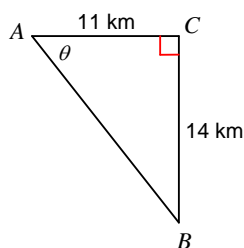


53)  $4.5$



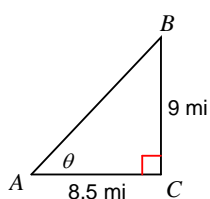
Find the measure of each angle indicated. Round to the nearest tenth.

54)



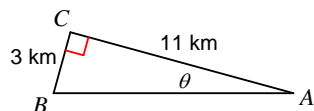
$51.8^\circ$

55)



$46.6^\circ$

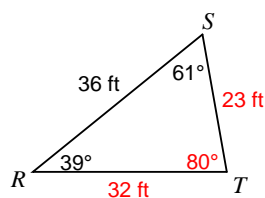
56)



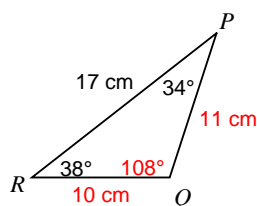
$15.3^\circ$

Solve each triangle. Round your answers to the nearest tenth.

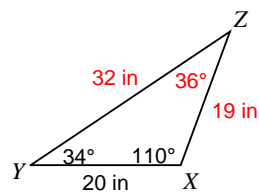
57)



58)



59)



Simplify. Your answer should contain only positive exponents.

$$60) \frac{(2 \cdot 2^{-2})^{-1}}{2}$$

$1$

$$61) \frac{2^4}{2 \cdot (2^{-3})^2}$$

$2^9$

$$62) \left( \frac{2^{-4} \cdot 2^{-3}}{2} \right)^4 \cdot \frac{1}{2^{32}}$$

$$63) \left( \frac{2x^4y^4 \cdot 2x^3}{(x^{-2}y^2)^{-2}} \right)^3$$

$64y^{24}x^9$

$$64) \frac{2y^{-1} \cdot (2yx^4)^{-2}}{2x^4} \cdot \frac{1}{4y^3x^{12}}$$

$$65) \left( \frac{vu^2}{u^2v^4 \cdot vu^2} \right)^{-2}$$

$u^4v^8$